

REMARKS

The Final Office Action mailed June 20, 2001, has been received and reviewed. Claims 7, 8, 13 through 16, 21, and 25 through 63 are currently pending in the application. Claims 13, 14, 21, 32 through 37, 45, 52 through 56, 62, and 63 are withdrawn from consideration. Claims 7, 8, 15, 16, 25 through 31, 38 through 44, 46 through 51, and 57 through 61 stand rejected. Applicants propose to amend claims 15, 47 through 51 and 58 through 61, and respectfully request reconsideration of the application as proposed to be amended herein.

35 U.S.C. § 132 Objection and 35 U.S.C. § 112 Claim Rejections

The amendment filed January 9, 2001, was objected to under 35 U.S.C. § 132 as allegedly introducing new matter into the disclosure. Claims 15, 16, 29, 38 through 44, 51, 57 through 61 stand rejected under 35 U.S.C. § 112, first paragraph, as containing subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

Specifically, claims 15, 29, 51, and 57 were rejected as the original disclosure allegedly does not support the limitation wherein the conductive material comprises both a generally planar first surface and a height to width ratio of at least approximately 3 to 1. Claims 38-40, 42 and 58-61 were rejected as the original disclosure allegedly failed to support any limitation of these claims. Applicants respectfully traverse this rejection, as hereinafter set forth.

Applicants respectfully submit that the limitations recited in claims 15, 29, 51, and 57 do not constitute new matter. Applicants respectfully submit that the present invention is directed to viscous adhesive material including a generally planar surface. (*Compare*, for example, FIGs. 3, 5, 8, 11, 15-17, and 22 with FIGs. 26, 27, 29, 31, 32, 35, and 36). Thus, one of skill in the art would understand that all components created with the viscous adhesive material of the present invention may include a generally planar surface. Similarly, the present application provides support for viscous adhesive material having a height to width ratio of the preferred target of 3:1 or greater. (*See, for example, specification*, page 18, lines 1-3; page 10, lines 2-4). Thus, one of skill in the art would understand

that viscous adhesive material of the present invention may include both a generally planar surface as well as a height to width ratio of the preferred target of 3:1 or greater. (See, for example, FIG. 22 and specification, pages 17, line 19 - page 18, line 6).

Applicants respectfully submit that the specification need not recite the claim limitations *ipsis verbis* in order to satisfy the written description requirements of 35 U.S.C. §112. *Fujikawa v. Wattanasin*, 93 F.3d 1559, 39 USPQ2d 1895 (Fed. Cir. 1996). The specification and drawings provide support for the limitations of claims 15, 29, 51, 52 and 57, which recite limitations of viscous adhesive material exhibiting a height-to-width ratio of at least approximately 3 to 1 and including a first surface adjacent said flip-chip and a second surface opposite said first surface exhibiting a generally planar portion.

Similarly, applicants submit that one of skill in the art would understand the teachings and disclosure of the specification may be combined as recited in dependent claims 16, 38 through 44, and 58 through 61. Support for claim 16 can be found, for example, in claim 8. Support for claims 38-40 and 59-61 may be found, for example, on pages 14-16, lines 16-2, of the specification. Support for claims 41, 42 and 58 may be found, for example, on page 13, lines 16-17 of the specification. Support for claim 43 and 44 may be found, for example, in claims 30 and 31. Accordingly, applicants respectfully submit that the disclosure reasonably conveyed the presently claimed invention to persons skilled in the art. Reconsideration and withdrawal of the objection and rejection is requested.

35 U.S.C. § 102 Anticipation Rejections

Anticipation Rejection Based on U.S. Patent No. 5,468,681 to Pasch

Claims 7, 8, 15, 16, 25 through 31, 38 through 44, 46 through 51, and 57 through 61 stand rejected under 35 U.S.C. § 102(a) as being anticipated by Pasch, U.S. Patent No. 5,468,681. Applicants respectfully traverse this rejection, as hereinafter set forth.

A claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference. *Verdegaal Brothers v. Union Oil Co. of California*, 2 USPQ2d 1051, 1053 (Fed. Cir. 1987). The identical invention must be shown

in as complete detail as is contained in the claim. *Richardson v. Suzuki Motor Co.*, 9 USPQ2d 1913, 1920 (Fed. Cir. 1989).

Pasch teaches a method for interconnecting conductive substrates using an interposer having conductive plastic filled vias. An interposer 1810 is formed having a plurality of through holes 1812. The through holes 1812 are force filled with a conductive plastic material 1820. Excess plastic material 1825b is scraped flush with a bottom surface of the interposer 1810. The interposer 1810 is positioned over a substrate 1840 and globs of material 1825a are pressed against onto contact pads of the substrate 1840. This pressure causes excess plastic material 1825d to protrude out of the other side of the interposer 1810 (FIG. 18d). The other side of the interposer 1810, having plastic bumps 1825d, is pressed against a second substrate 1850.

By way of contrast, independent claim 7 of the presently claimed invention recites, "a semiconductor substrate including at least one adhesive patch comprised of a viscous adhesive material, the at least one adhesive patch including a first surface adjacent said semiconductor substrate and a second, smaller surface opposite said first surface exhibiting a generally planar portion over a substantial portion thereof, said semiconductor substrate including said at least one adhesive patch formed by: providing a semiconductor substrate; dispensing a viscous adhesive material on said semiconductor substrate; and inverting said semiconductor substrate without effecting substantial lateral confinement of said adhesive material and maintaining said semiconductor substrate in an inverted position at least until said viscous adhesive material sufficiently stabilizes so as to exhibit a desired stable shape and a lateral boundary defining sizes of said first and second surfaces of said at least one adhesive patch and wherein at least a substantial portion of said second, smaller surface of said adhesive patch exhibits a generally planar configuration and said size of said second, smaller surface is smaller than said size of said first surface."

Applicants respectfully submit that Pasch fails to teach every limitation of independent claim 7. For example, Pasch fails to teach "at least one adhesive patch including a first surface adjacent said semiconductor substrate and a second, smaller surface opposite said first surface exhibiting a generally planar portion over a substantial portion thereof." Instead, Pasch lacks any disclosure of

the relative size of the surface of the globs. Similarly, FIGs. 18b-18e suggest that globs 1825a-1825e are substantially the same size. Pasch also fails to teach that glob 1825d includes a planar portion over a substantial portion thereof.

Applicants further submit that the process limitations of claim 7 impose further structural limitations not taught by Pasch. For example, Pasch fails to teach the structural limitations created by "inverting said semiconductor substrate without effecting substantial lateral confinement of said adhesive material and maintaining said semiconductor substrate in an inverted position at least until said viscous adhesive material sufficiently stabilizes so as to exhibit a desired stable shape and a lateral boundary defining sizes of said first and second surfaces of said at least one adhesive patch and wherein at least a substantial portion of said second, smaller surface of said adhesive patch exhibits a generally planar configuration and said size of said second, smaller surface is smaller than said size of said first surface." By way of contrast, Pasch laterally confines the adhesive material in through holes 1812. Pasch lacks any disclosure of maintaining a substrate having adhesive material thereon in an inverted position until the viscous adhesive material sufficiently stabilizes so as to exhibit a desired stable shape. Instead, Pasch teaches scraping the top of conductive epoxy and forcing conductive globs 1825a-1825e against substrates to form conductive *liquid* seals. (Pasch, col. 36, lines 46-49). As Pasch fails to teach every limitation of independent claim 7, applicants respectfully submit that claim 7 is not anticipated by Pasch. Reconsideration and withdrawal of the rejection is requested.

Claims 8 and 25 through 31 are each allowable over Pasch as depending, either directly or indirectly, from allowable independent claim 7.

Claim 26 is further allowable as Pasch fails to teach the structural limitation wherein the at least one adhesive patch comprises at least one lateral edge exhibiting an angle of repose of at least approximately 20 degrees. Instead, Pasch lacks any disclosure regarding the particular angle of response of the globs.

Claim 27 is further allowable as Pasch fails to teach the structural limitation wherein said at least one adhesive patch comprises at least one trailing edge exhibiting an angle of repose of at least

approximately 13 degrees. Instead, Pasch lacks any disclosure regarding the particular angle of response of the globs..

Claim 28 is further allowable as Pasch fails to teach the structural limitation wherein said at least one adhesive patch comprises at least one leading edge exhibiting an angle of repose of at least approximately 20 degrees. Instead, Pasch lacks any disclosure regarding the particular angle of response of the globs.

Claim 29 is further allowable as Pasch fails to teach the structural limitation wherein said at least one adhesive patch comprises a height-to-width ratio of at least approximately 3 to 1. Instead, Pasch lacks any disclosure of the height-to-width ratio of the globs.

By way of contrast with Pasch, independent claim 15 recites, a "flip-chip including at least one conductive bump comprised of a viscous conductive material, the at least one conductive bump exhibiting a height-to-width ratio of at least approximately 3 to 1 and including a first surface adjacent said flip-chip and a second surface opposite said first surface exhibiting a generally planar portion over a substantial portion thereof, said flip chip including said at least one conductive bump formed by: providing said flip-chip with at least one bond pad; dispensing a viscous conductive material on said flip-chip to define at least one conductive bump of a selected configuration exhibiting a height-to-width ratio of at least approximately 3 to 1, said at least one conductive bump in electrical communication with said at least one bond pad of said flip-chip and including a first surface adjacent said flip-chip and a second surface opposite said first surface; and inverting said flip-chip without substantial lateral confinement of said viscous conductive material and maintaining said flip-chip in an inverted position at least until said conductive material substantially stabilizes so as to exhibit a desired stable shape and lateral boundary substantially defining sizes of said first and second surfaces of said at least conductive bump and wherein a substantial portion of said second surface of said conductive bump exhibits a generally planar configuration."

Pasch fails to teach every limitation of claim 15. Pasch fails to teach at least one conductive bump exhibiting a height-to-width ratio of at least approximately 3 to 1. Instead, Pasch lacks any disclosure of the height-to-width ratio of the globs 1825a-1825e. Applicants further submit that the

process limitations of claim 15 impose further structural limitations not taught by Pasch. For example, Pasch fails to teach the limitations imposed by "inverting said flip-chip without substantial lateral confinement of said viscous conductive material and maintaining said flip-chip in an inverted position at least until said conductive material substantially stabilizes so as to exhibit a desired stable shape and lateral boundary substantially defining sizes of said first and second surfaces of said at least conductive bump and wherein a substantial portion of said second surface of said conductive bump exhibits a generally planar configuration." By way of contrast, Pasch laterally confines the conductive plastic material in through holes 1812. Pasch lacks any disclosure of maintaining a flip-chip having adhesive material thereon in an inverted position until the conductive material sufficiently stabilizes so as to exhibit a desired stable shape and lateral boundary. Instead, Pasch teaches scraping the top of conductive epoxy and forcing conductive blobs 1825a-1825e against substrates to form conductive *liquid* seals. (Pasch, col. 36, lines 46-49). As Pasch fails to teach every limitation of independent claim 15, applicants respectfully submit that claim 15 is not anticipated by Pasch. Reconsideration and withdrawal of the rejection is requested.

Claims 16 and 38 through 44 are each allowable over Pasch as depending, either directly or indirectly, from allowable independent claim 15.

Claim 38 is further allowable as Pasch fails to teach the structural limitation wherein the at least one conductive bump comprises at least one lateral edge exhibiting an angle of repose of at least approximately 20 degrees. Instead, Pasch lacks any disclosure regarding the particular angle of response of the globs..

Claim 39 is further allowable as Pasch fails to teach the structural limitation wherein said at least one conductive bump comprises at least one trailing edge exhibiting an angle of repose of at least approximately 12 degrees. Instead, Pasch lacks any disclosure regarding the particular angle of response of the globs..

Claim 40 is further allowable as Pasch fails to teach the structural limitation wherein said at least one conductive bump comprises at least one leading edge exhibiting an angle of repose of at

least approximately 20 degrees. Instead, Pasch lacks any disclosure regarding the particular angle of response of the globs.

By way of contrast with Pasch, independent claim 46 recites, a "semiconductor substrate including at least one adhesive patch comprised of a viscous adhesive material, the at least one adhesive patch including a first surface adjacent said semiconductor substrate and a second surface opposite said first surface, said second surface exhibiting a generally planar portion over a substantial portion thereof." Applicants respectfully submit that Pasch fails to teach an adhesive patch including "a first surface adjacent said semiconductor substrate and a second surface opposite said first surface, said second surface exhibiting a generally planar portion over a substantial portion thereof." Instead, Pasch lacks any disclosure of the relative size of the opposite surfaces of the globs 1825a-1825e. In FIG. 18e, globs 1825a and 1825e appear to be substantially the same size. As Pasch fails to teach every limitation of independent claim 46, applicants respectfully submit claim 46 is not anticipated by Pasch. Reconsideration and withdrawal of the rejection is requested.

Claims 47 through 51 are each allowable as depending, either directly or indirectly, from allowable claim 46.

Claim 48 is further allowable as Pasch fails to teach wherein said at least one adhesive patch comprises at least one lateral edge exhibiting an angle of repose of at least approximately 20 degrees. Instead, Pasch lacks any disclosure of the particular angle of repose of the globs.

Claim 49 is further allowable as Pasch fails to teach wherein said at least one adhesive patch comprises at least one trailing edge exhibiting an angle of repose of at least approximately 13 degrees. Instead, Pasch lacks any disclosure of the particular angle of repose of the globs.

Claim 50 is further allowable as Pasch fails to teach wherein said at least one adhesive patch comprises at least one leading edge exhibiting an angle of repose of at least approximately 20 degrees. Instead, Pasch lacks any disclosure of the particular angle of repose of the globs.

Claim 51 is further allowable as Pasch fails to teach wherein said at least one adhesive patch exhibits a height-to-width ratio of at least approximately 3 to 1. Instead, Pasch lacks any disclosure of the height-to-width ratio of the globs.

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By way of contrast with Pasch, independent claim 57 recites, a "flip-chip including at least one conductive bump comprised of a viscous conductive material, the at least one conductive bump exhibiting a height-to-width ratio of at least approximately 3 to 1 and including a first surface adjacent said flip-chip and a second surface opposite said first surface, said second surface exhibiting a generally planar portion over a substantial portion thereof." Pasch fails to teach at least one conductive bump exhibiting a height-to-width ratio of at least approximately 3 to 1. Instead, Pasch lacks any disclosure of the height-to-width ratio of the globs. As Pasch fails to teach every limitation of independent claim 57, applicants respectfully submit claim 57 is not anticipated by Pasch. Reconsideration and withdrawal of the rejection is requested.

Claims 58 through 61 are each allowable as depending from allowable claim 57.

Claim 59 is further allowable as Pasch fails to teach wherein said at least one conductive bump comprises at least one lateral edge exhibiting an angle of repose of at least approximately 20 degrees. Instead, Pasch lacks any disclosure of the specific angle of repose of the globs.

Claim 60 is further allowable as Pasch fails to teach wherein said at least one conductive bump comprises at least one trailing edge exhibiting an angle of repose of at least approximately 13 degrees. Instead, Pasch lacks any disclosure of the specific angle of repose of the globs.

Claim 61 is further allowable as Pasch fails to teach wherein said at least one conductive bump comprises at least one leading edge exhibiting an angle of repose of at least approximately 20 degrees. Instead, Pasch lacks any disclosure of the specific angle of repose of the globs.

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ENTRY OF AMENDMENTS

The proposed amendments to claims 15, 47 through 51 and 58 through 61 above should be entered by the Examiner because the amendments are supported by the as-filed specification and drawings and do not add any new matter to the application. Further, the amendments do not raise new issues or require a further search. Finally, if the Examiner determines that the amendments do not place the application in condition for allowance, entry is respectfully requested upon filing of a Notice of Appeal herein.

CONCLUSION

Claims 7, 8, 15, 16, 25 through 31, 38 through 44, 46 through 51, and 57 through 61 are believed to be in condition for allowance, and an early notice thereof is respectfully solicited. Should the Examiner determine that additional issues remain which might be resolved by a telephone conference, he is respectfully invited to contact Applicants' undersigned attorney.

Respectfully Submitted,



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Enclosure: Version With Markings to Show Changes Made

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